

# PATENT ABSTRACTS OF JAPAN

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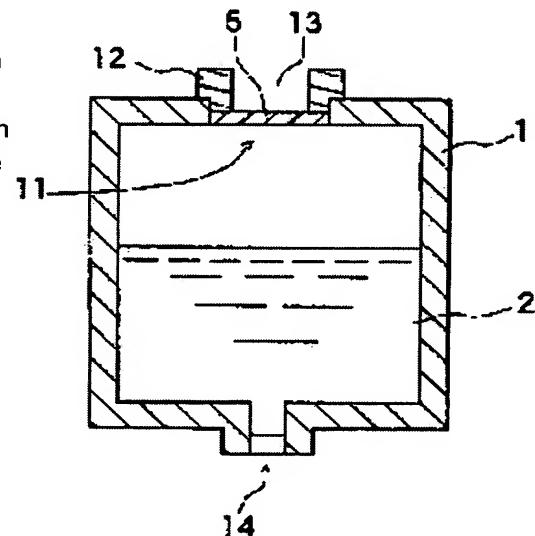
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## (54) AIR FILTER FOR INK VESSEL AND INK VESSEL USING THE SAME

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide an air filter and an ink vessel having the same wherein ink hardly leaks therefrom even when change of a temperature occurs in a condition that the air filter is contacted with the ink and thermal expansion of the air in a case or evaporation of the ink occurs and then the ink is pressed against the air filter.

**SOLUTION:** The air filter 5 wherein at least one layer of a porous body made from a fluororesin such as polytetrafluoro-ethylene or a polyolefin resin and at least one layer of an air-permeable support material of which the tensile stress is not less than 1 MPa are laminated is attached to an air hole of the ink vessel.



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## CLAIMS

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### [Claim(s)]

[Claim 1] The aeration filter for ink containers characterized by being the layered product which contains further at least the porous body which consists at least of one side chosen from a fluororesin and polyolefin resin, and the permeability supporting material whose tensile strength is 1 or more MPas, respectively.

[Claim 2] The aeration filter for ink containers according to claim 1 the permeability of permeability supporting material displays with the number of ~~gar rhes~~, and is [ filter ] 300 seconds / 100ml or less.

[Claim 3] the aeration filter for ink containers according to claim 1 or 2 with which a layered product is further alike at least, and water-repellent oil-repellent processing is performed.

[Claim 4] The aeration filter for ink containers according to claim 1 to 3 with which a porous body consists of polytetrafluoroethylene, and permeability supporting material consists of ultra high molecular weight polyethylene.

[Claim 5] The ink container characterized by having the space in which ink is held, and at least one air hole in which the aeration filter according to claim 1 to 4 was prepared.

## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

#### [0001]

[Field of the Invention] This invention relates to the aeration filter for ink containers, and the ink container which used this, and relates to the ink container equipped with the air hole which flows through the building envelope and outer space for containing and keeping ink in more detail, and the aeration filter prepared in this air hole.

#### [0002]

[Description of the Prior Art] From the former, the device which supplies ink to a print head from an ink cartridge is used abundantly with image formation equipments, such as a printer. By this device, the ink cartridge which held ink in the container beforehand is carried in predetermined locations, such as a printer. In this condition, ink is supplied to a print head from an ink cartridge. The ink reservoir container which holds ink temporarily between an ink cartridge and a print head may be prepared. Generally as a dispersion medium of an ink component, the mixed solvent of water or water, and the organic solvent (for example, lower alcohol, such as a methanol, ethanol,

isopropyl alcohol, and n-propanol) that has good compatibility is used.

[0003] However, if the oil level of ink descends as ink decreases in number, negative pressure will arise for the interior of an ink cartridge, or the path of ink. If this negative pressure becomes large, the normal regurgitation of ink will be barred and a blur will arise in printing. Then, the air hole is prepared in the path of an ink cartridge or ink. An air hole is prepared in the location which is not flooded with ink in the state of the anticipated use which carried the ink cartridge in the printer. However, when a printer and an ink cartridge are leaned at the time of transport and storage, an air hole is flooded with ink and there is a possibility that ink may be revealed from an air hole. For this reason, although an air hole is made to pass air, it is proposed by it that a liquid attaches the aeration filter which is not passed, for example, a polytetrafluoroethylene (henceforth "PTFE") porous body etc.

[0004] Furthermore, recently, in order to gather the printing speed of a printer, pressurizing the inside of an ink cartridge and an ink path, and accelerating the regurgitation of ink has come to be performed. Moreover, since there is a possibility that the ink of an ink cartridge or an ink path may leak from a print head when the ambient temperature of the printer circumference rises, making an ink cartridge and an ink path into negative pressure at the time of printing termination, and sucking up ink has come to be performed.

[0005]

[Problem(s) to be Solved by the Invention] Thus, the engine performance which it is also stabilized in an aeration filter for a certain reason that positive pressure or negative pressure is applied through an air hole, and prevents ink leakage is called for. Then, this invention aims at offering the aeration filter for ink containers which has the high ink leakage control engine performance. Moreover, another object of this invention is to offer the ink container which used this aeration filter.

[0006]

[Means for Solving the Problem] In order to attain the above-mentioned object, the aeration filter for ink containers of this invention is characterized by being the layered product which contains further at least the porous body which consists at least of one side chosen from a fluororesin and polyolefin resin, and the permeability supporting material whose tensile strength is 1 or more MPas, respectively. In addition, with this description, it is JIS about tensile strength. K It shall set according to 7127. However, a test period is considered as a part for 200mm/.

[0007] With the aeration filter for ink containers of this invention, a porous body is reinforced by permeability supporting material, and since the tensile strength of

permeability supporting material is 1 or more MPas further, it has the high ink leakage control engine performance. Since tensile strength is especially reinforced by high permeability supporting material, deformation by application of pressure or reduced pressure can be controlled effectively. Moreover, since the ingredient which can perform accurate porosity-ization easily is used for the porous body, it can consider as an aeration filter with high aeration stability. Especially the upper limit of the tensile strength of permeability supporting material is not limited. However, from a viewpoint of the workability in the case of joining a porous body and permeability supporting material by joining etc., 1MPa-1500MPa is suitable for tensile strength, and it is 3MPa-500MPa more preferably.

[0008] With the aeration filter of this invention, the permeability of permeability supporting material displays with the number of gar rhes, and it is desirable that they are 300 seconds / 100ml or less. It is because the pressure differential of ink container inside and outside is promptly cancelable. In addition, on these descriptions, it shall set by the gar rhe examining method by which the number of gar rhes is specified JIS P8117. Especially the minimum of the number of gar rhes is not limited. However, from a viewpoint of reinforcing a porous body, 0.1 seconds / 100ml - 300 seconds / 100ml are suitable for the number of gar rhes, and they are 0.5 seconds / 100ml - 100 seconds / 100ml more preferably.

[0009] moreover, it is desirable that a layered product is further alike at least, and water-repellent oil-repellent processing is performed with the aeration filter of this invention. It is because osmosis of the ink to a filter is controlled and leakage of ink can be controlled still more effectively. Moreover, it is desirable that a porous body consists of PTFE and permeability supporting material consists of ultra high molecular weight polyethylene with the aeration filter of this invention.

[0010] The ink container of this invention is characterized by having the space in which ink is held, and at least one air hole in which the aeration filter of the above-mentioned publication was prepared. The ink container of this invention becomes that whose ink leakage control engine performance improved.

[0011]

[Embodiment of the Invention] Hereafter, the desirable operation gestalt of this invention is explained, referring to a drawing. Drawing 1 is the sectional view showing one gestalt of the ink container (ink cartridge) which used the aeration filter of this invention. The interior of the case 1 of this ink cartridge is used as space for holding ink 2. Ink 2 is poured in inside a case from the ink injected hole 11. Cap 12 is inserted in the ink injected hole 11 after pouring in ink 2. Ink 2 is sent into drawing equipments,

such as a printer head, from the ink discharge opening 14, where a printer head etc. is equipped with an ink cartridge.

[0012] The air hole 13 is formed in the interior of cap 12, and the building envelope and outer space (atmospheric air) of a case 1 have flowed through this air hole 13. The aeration filter 5 is attached in the air hole 13. The aeration filter 5 is compound-ized by the cap 12 attached so that the ink injected hole 11 might be closed. The aeration filter 5 should just fix on the cap 12 beforehand by heating joining, ultrasonic welding, oscillating joining, adhesion, adhesion, etc.

[0013] In addition, two or more air holes 13 equipped with the aeration filter 5 may be formed in a case. In this case, it is desirable to arrange two or more air holes so that at least one air hole may not be buried in the ink in which only the amount of conventions was introduced irrespective of the position of an ink cartridge.

[0014] The layered product of the porous body and permeability supporting material which consist of PTFE or polyolefin resin can be used for the aeration filter 5. There is especially no limit in the sequence of the number of laminatings, and a laminating etc. that much more porous body and permeability supporting material should just be contained in this layered product at least. In addition, it is better for the side which faces the building envelope (ink hold space) of an ink container to be the above-mentioned porous body, in order to make the permeability of ink low. Therefore, as for an aeration filter, it is desirable that the above-mentioned porous body is exposed from one [ at least ] field.

[0015] Drawing 2 is the sectional view showing one another gestalt of the ink container (ink cartridge) of this invention. In this ink cartridge, it has fixed in the direct case 2 so that the aeration filter 5 may cover the ink injected hole 11. In addition, with any gestalt of drawing 1 and drawing 2, decompressing through an aeration filter, instead of pouring in from an ink injected hole, ink may be sucked up from the ink discharge opening 14, and you may introduce inside a case.

[0016] Drawing 3 is the sectional view showing one gestalt of the ink reservoir container which is an ink container of this invention. This ink reservoir container is pressurized from the outside through the aeration filter 5, and has the structure of breathing out ink compulsorily from a discharge opening 14, or decompressing conversely and attracting ink from the attraction hole 15. But this invention is applicable not only to the gestalt shown in drawing 1 – drawing 3 but a general ink container.

[0017] Hereafter, a porous body and permeability supporting material are explained. As a porous body, fluororesin porous membrane and polyolefine porous membrane can

be used. As a fluororesin, a PTFE, polychlorotrifluoroethylene resin, and tetrafluoroethylene-hexafluoropropylene copolymer, a tetrafluoroethylene-perfluoroalkyl vinyl ether copolymer, a tetrafluoroethylene-ethylene copolymer, etc. are mentioned. As polyolefine, polyethylene, polypropylene, poly4 methyl 1 pentene, poly1 butene, etc. are mentioned. Since especially PTFE porous membrane is excellent in permeability, ink-proof nature, and water-repellent oil repellency, it can prevent lowering of the permeability by blinding, or can prevent ink leakage for a long time.

[0018] An example of an approach which manufactures PTFE porous membrane is explained below. First, the paste-like admixture which added the fluid lubrication agent to PTFE fine powder is preformed. A fluid lubrication agent can wet the front face of PTFE fine powder, especially if removable [ with an extract or desiccation ], it will not be restricted, for example, it can use hydrocarbons, such as a liquid paraffin, naphtha, and White oil. 5 – 50 weight section extent is suitable for the addition of a fluid lubrication agent to the PTFE fine powder 100 weight section. The above-mentioned preforming is performed by the pressure which is extent by which a fluid lubrication agent is not pressed out. Next, a preforming object is fabricated in the shape of a sheet with paste extrusion or rolling, this PTFE Plastic solid is extended to at least 1 shaft orientations, and PTFE porous membrane is obtained. In addition, as for the drawing of a PTFE Plastic solid, it is desirable to carry out, after removing a fluid lubrication agent. This porous body may be heated and calcinated at the temperature more than the melting point of PTFE.

[0019] If too large, membranous reinforcement will fall, or ink leakage becomes easy to generate the aperture of porous membrane by the pressure buildup inside an ink container. For this reason, 0.01–5 micrometers 10 micrometers or less are usually suitable for especially the average aperture of porous membrane.

[0020] Similarly, if too thin, the reinforcement of a porous body will fall, or ink leakage becomes easy to generate the thickness of porous membrane by the pressure buildup inside an ink container. For this reason, 10–1000 micrometers 2 micrometers or more are usually suitable for especially the thickness of porous membrane.

[0021] Permeability supporting material sets tensile strength to 1 or more MPas in consideration of the endurance over the stress at the time of pressurizing or decompressing especially in an aeration filter, although construction material, structure, and a gestalt are not limited. Moreover, 300 seconds / 100ml or less of permeability are desirable at the number of garrhes. Moreover, as for the permeability supporting material from a viewpoint of the joining nature to an ink container or the

components for wearing, consisting of thermoplastics is desirable, and 250 degrees C or less are suitable for the melting point.

[0022] Specifically as a permeability supporting material, a polyolefine porous body, a nonwoven fabric, textile fabrics, a network, a mesh, sponge, form, a metal porous body, a metal mesh, and other various porous body ingredients can be used. Especially an ultra-high-molecular-weight-polyethylene porous body is desirable from viewpoints, such as reinforcement, elasticity, permeability, workability, and joining nature. The average molecular weight according [ this ultra high molecular weight polyethylene ] to a viscosity method is the thing of 500,000–10 million preferably 300,000 or more.

[0023] It may also be good to merely pile up, it may join by joining, such as heating joining, ultrasonic welding, and oscillating joining, and may join compound-ization with a porous body and permeability supporting material using adhesives (a pressure sensitive adhesive, hot melt adhesive, thermosetting adhesive, etc.). In the case of the approach (heat lamination) accompanied by heating, the approach of making carry out melting of some permeability supporting material, and welding it, powder, the approach of making an interface intervene, heating hot melt adhesive, such as the shape of granular or a mesh, and joining, etc. are employable.

[0024] As mentioned above, especially the sequence of the laminating of a porous body and permeability supporting material may not be restricted, but may carry out the laminating of a porous body and the permeability supporting material by turns, may contain the layer which piled up the porous body continuously, and may use the porous body containing resin of a different kind. The example of the composite construction of an aeration filter is shown in drawing 4 and drawing 5.

[0025] The aeration filter 5 shown in drawing 4 is the compounded complex every much more about a porous body 6 and the permeability supporting material 7. As for this aeration filter, it is desirable to arrange so that a porous body 6 may face the space in which ink is held. The aeration filter 5 shown in drawing 5 is the complex which pinched much more permeability supporting material 7 by the porous body 6 of a bilayer.

[0026] According to the engine performance of a porous body, or the property of ink, water-repellent oil-repellent processing may be performed to an aeration filter. Although giving the porous body of an aeration filter is desirable as for water-repellent oil-repellent processing, it can also be performed to permeability supporting material, and may be performed to the whole aeration filter.

[0027] As a water-repellent oil-repellent processing agent, various kinds of fluorine-containing polymers can specifically be used. The macromolecule which has a

fluorine-containing chain forms the coat of low surface energy on the surface of fiber, and demonstrates the water-repellent oil-repellent effectiveness. As a fluorine-containing polymer, the macromolecule which has a perfluoroalkyl radical is desirable. As a polymer which has a perfluoroalkyl radical, the water-repellent oil-repellent processing agent of marketing, such as Fluorad (Sumitomo 3M make), a Scotch whisky guard (Sumitomo 3M make), a tex guard (Daikin Industries make), a uni-dyne (Daikin Industries make), and the Asahi guard (Asahi Glass make), can be used. What is necessary is for the impregnation to a water-repellent oil-repellent processing agent, spreading of this processing agent, a spray, etc. just to perform water-repellent oil-repellent processing. As for the coverage of a water-repellent oil-repellent processing agent, it is desirable to adjust so that sufficient water-repellent oil repellency may be obtained and the permeability of an aeration filter may not be barred.

[0028]

[Example] Hereafter, this invention is not restricted by the following examples although an example explains this invention to a detail further.

(Example 1) The aeration filter with the same configuration as lamination and drawing 4 for a PTFE porous body (thickness: 85 micrometers, 80% of porosity, average aperture: 1micrometer, number of gar rhes: 3 seconds /, 100ml) and SHINTEKKUSU PS-120 (the Mitsui Chemicals make, thickness: 0.6mm, tensile strength: 6MPa, number of gar rhes: 1 second /, 100ml) which are a polypropylene nonwoven fabric was produced by heat lamination.

[0029] In order to obtain the ink container which, on the other hand, attached the aeration filter produced above and which is shown in drawing 6, it was filled up with the commercial ink 9 for printers (surface tension 33 dyne/cm) three times 30cm in the cylinder-like case 8 made from plastics with a diameter [ of 2cm ], and a height of 20cm. Moreover, the cap 22 made from polypropylene which the hole with a diameter of 5mm penetrated as an air hole 23 was prepared. Moreover, the lid 10 was beforehand attached in the ink delivery 24 with a bore of about 1mm. And heating welding was carried out and the above-mentioned aeration filter 5 which consists of a PTFE porous body and a nonwoven fabric made from polypropylene was united with the cap 22 so that an air hole 23 might be covered. The aeration filter has been arranged so that a PTFE porous body may become an ink side (interior side of a case) and a nonwoven fabric may become an atmospheric-air side.

[0030] (Example 2) uni--- dyne TG-725 (Daikin Industries make) was diluted with toluene, and the water-repellent oil-repellent processing agent of 5 % of the weight of

solid content was produced. This processing agent was applied to the PTFE porous body (thickness: 85 micrometers, 75% of porosity, average aperture:0.2micrometer, number of gar rhes:21 seconds /, 100ml), and the PTFE porous body which heated for 3 minutes at 130 degrees C, and performed water-repellent oil-repellent processing was obtained. With this PTFE porous body that carried out water-repellent oil-repellent processing, as a permeability supporting material, the ultra-high-molecular-weight-polyethylene porous body (average molecular weight by the viscosity method: 4,400,000, thickness:0.5mm, tensile strength:12MPa, number of gar rhes:1.5 seconds /, 100ml) was prepared, the aeration filter was produced like the example 1, and the ink container was obtained still like the example 1.

[0031] (Example 3) If it replaced with the PTFE porous body and the point using a polypropylene porous body (thickness: 10 micrometers, porosity:50%, average aperture:0.04micrometer, number of gar rhes:200 seconds /, 100ml) was removed, the aeration filter was produced like the example 2 and the ink container was obtained further.

[0032] (Example 1 of a comparison) If the point using TAPIRUSU P030UA-00X (the TONEN TAPYRUS make, thickness: 0.5mm, tensile strength:0.6MPa, number of gar rhes:1 second /, 100ml) which is a polyurethane nonwoven fabric was removed as a permeability supporting material, the aeration filter was produced like the example 1 and the ink container was obtained further.

[0033] (Example 2 of a comparison) If the point using the polypropylene porous body (thickness: 0.03mm, tensile strength:0.9MPa, number of gar rhes:400 seconds /, 100ml) as a permeability supporting material was removed, the aeration filter was produced like the example 1 and the ink container was obtained further.

[0034] The following trial was performed using the ink container obtained by an above-mentioned example and the above-mentioned example of a comparison. First, as an ink leakage test, it supplied to the testing machine rotated in 1 revolution 1 second, and a blot of ink and leakage were visually observed [ the testing machine ] for the filter to a stop and 500,000 revolutions for every count of predetermined so that ink might contact an aeration filter, as shown in drawing 7 . The case where O, and a blot of ink and leakage were observed in the case where neither a blot of ink nor leakage is observed was made into x.

[0035] Moreover, when a container is maintained at the position of an abbreviation straight as an ink regurgitation trial as shown in drawing 6 , a lid 10 was removed and a delivery 24 was opened, it observed by viewing whether ink would be breathed out within 10 seconds. The case where it was breathed out was made as O and the case

where it was not breathed out was made into x.

[0036] The result of a trial of an ink leakage test and an ink regurgitation trial is shown in a table 1.

[0037]

(A table 1)

	An ink leakage test	An ink regurgitation trial
100,000 times	500,000 times	An example 1 O x
O An example 2 O O O	An example 3 O O O	-----
Example 1 of a comparison x - O	Example 2 of a comparison x - x	-----

[0038]

[Effect of the Invention] As explained above, according to this invention, the ink container which can prevent effectively leakage of the ink at the time of transport and storage is offered by using the aeration filter which carried out the laminating of the porous body which consists of either [ at least ] PTFE or polyolefin resin, and the permeability supporting material whose tensile strength is 1 or more MPas further at least, respectively.

#### [Brief Description of the Drawings]

[Drawing 1] It is the sectional view of one gestalt of the ink container of this invention.

[Drawing 2] It is the sectional view of one another gestalt of the ink container of this invention.

[Drawing 3] It is the sectional view of one gestalt of the ink container of this invention another again.

[Drawing 4] It is the sectional view of one gestalt of the aeration filter of this invention.

[Drawing 5] It is the sectional view of one another gestalt of the aeration filter of this invention.

[Drawing 6] It is the sectional view of the ink container produced in the example.

[Drawing 7] It is drawing for explaining a revolution of the ink container in the trial performed in the example.

#### [Description of Notations]

1 Eight Case

2 Nine Ink

5 Aeration Filter

6 Porous Body

7 Permeability Supporting Material

10 Lid

- 11 Ink Feed Hopper
- 12 22 Cap
- 13 23 Air hole
- 14 24 Ink delivery
- 15 Ink Attraction Hole

## DRAWINGS

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[Drawing 3]

[Drawing 4]

[Drawing 5]

[Drawing 6]

## \* NOTICES \*

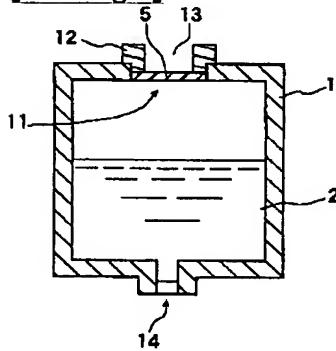
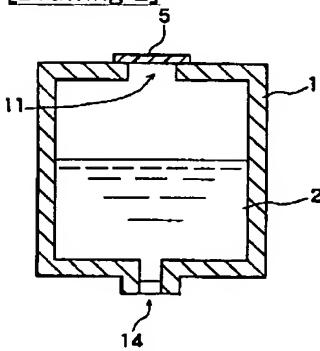
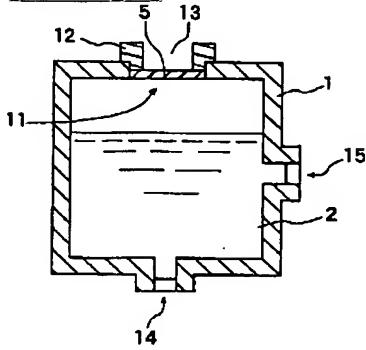
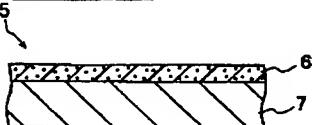
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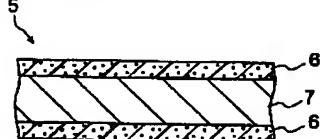
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**DRAWINGS**

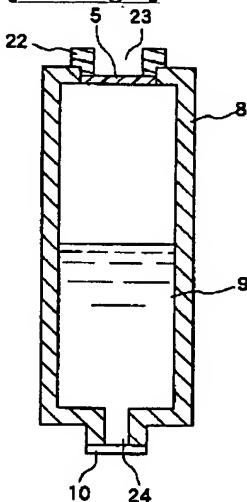
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**[Drawing 1]****[Drawing 2]****[Drawing 3]****[Drawing 4]**

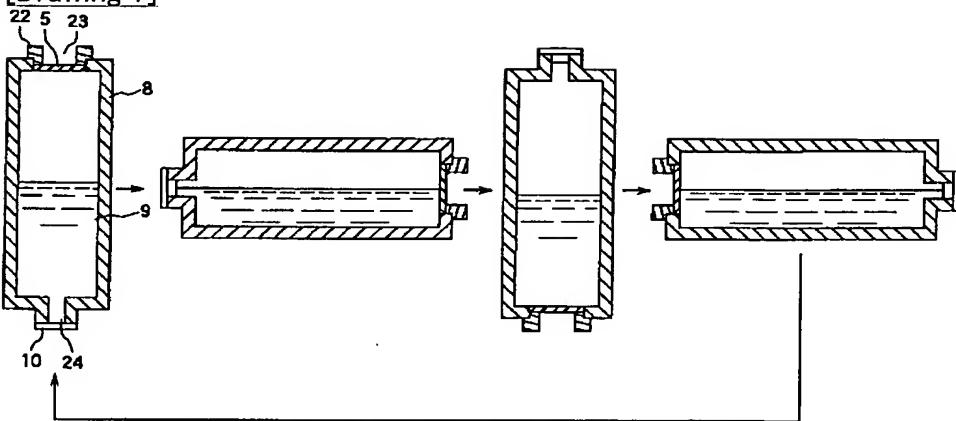
[Drawing 5]



[Drawing 6]



[Drawing 7]



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[Translation done.]

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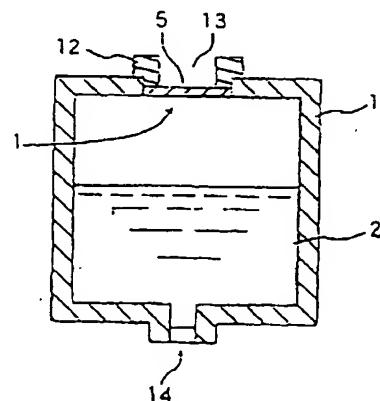
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权利要求书 2 页 说明书 8 页 附图页数 4 页

[54] 发明名称 透气式过滤器及包括该透气式过滤器的油墨盒

[57] 摘要

一种油墨盒所用的透气式过滤器，它包括一个叠片，该叠片包括至少一个多孔材料层和至少一个透气式衬底层，该多孔材料层包括选自含氟树脂和聚烯烃树脂的至少一种树脂，而所述透气式衬底层的抗拉强度为 1 MPa 或者更大。还描述了一种油墨盒，它包括一个用于盛放油墨的空间 和至少一个其中安放着这种透气式过滤器的气孔。



I S S N 1 0 0 8 - 4 2 7 4

## 权利要求书

1. 一种油墨盒所用的透气式过滤器，它包括一个叠片，所述叠片包括至少一个多孔材料层和至少一个透气式衬底层，所述多孔材料层包括选自含氟树脂和聚烯烃树脂的至少一种树脂，而所述透气式衬底层的抗拉强度为 1MPa 或者更大。

5 2. 权利要求 1 的油墨盒所用的透气式过滤器，其特征在于所述透气式衬底的透气能力用格利数来表示优选为 300 sec/100 ml 或者更小。

3. 权利要求 1 的油墨盒所用的透气式过滤器，其特征在于所述叠片的至少一个层具有防水和防油能力。

10 4. 权利要求 1 的油墨盒所用的透气式过滤器，其特征在于所述多孔材料包括聚四氟乙烯，而所述透气式衬底优选地包括一种超高分子聚乙烯。

15 5. 一种油墨盒，它包括一个用于盛放油墨的空间和至少一个其中安放着一个透气式过滤器的气孔，所述透气式过滤器包括一个叠片，所述叠片包括至少一个多孔材料层和至少一个透气式衬底层，所述多孔材料层包括选自含氟树脂和聚烯烃树脂的至少一种树脂，而所述透气式衬底层的抗拉强度为 1MPa 或者更大。

20 6. 权利要求 1 的油墨盒所用的透气式过滤器，其特征在于透气式衬底的抗拉强度为 1MPa 到 1500MPa。

25 7. 权利要求 6 的油墨盒所用的透气式过滤器，其特征在于透气式衬底的抗拉强度为 3MPa 到 500MPa。

8. 权利要求 2 的油墨盒所用的透气式过滤器，其特征在于透气式过滤器的格利数为 0.1 sec/100 ml 到 300 sec/100 ml。

9. 权利要求 8 的油墨盒所用的透气式过滤器，其特征在于透气式过滤器的格利数为 0.5 sec/100 ml 到 100 sec/100 ml。

25 10. 权利要求 1 的油墨盒所用的透气式过滤器，其特征在于多孔材料的平均孔径为 10  $\mu\text{m}$  或者更小。

11. 权利要求 10 的油墨盒所用的透气式过滤器，其特征在于多孔材料的平均孔径 0.01  $\mu\text{m}$  到 5  $\mu\text{m}$ 。

30 12. 权利要求 1 的油墨盒所用的透气式过滤器，其特征在于多孔材料的厚度优选为 2  $\mu\text{m}$  或者更大。

13. 权利要求 12 的油墨盒所用的透气式过滤器，其特征在于多孔材

料的厚度为  $10\mu\text{m}$  到  $1000\mu\text{m}$ .

14. 权利要求 4 的油墨盒所用的透气式过滤器，其特征在于超高分子聚乙烯的测粘平均分子量为 300000 或者更大。

15. 权利要求 14 的油墨盒所用的透气式过滤器，其特征在于超高分子聚乙烯的测粘平均分子量为 500000 到 1000000.

16. 权利要求 5 的油墨盒，其特征在于透气式过滤器的多孔材料面朝向油墨盒的内部空间。

## 说 明 书

透 气 式 过 滤 器 及 包 括  
该 透 气 式 过 滤 器 的 油 墨 盒

5 本发明涉及一种油墨盒所用的透气式过滤器及包括这种透气式过滤器的油墨盒。更具体而言，本发明涉及一种包括一个连通着用于盛放和储存油墨的内部空间与外部空间的气孔和一个有待于安放在该气孔中的透气式过滤器的油墨盒。

10 迄今为止，大多数成像设备例如打印机都要用一种机构来将油墨从油墨盒送往打印头中。在这种机构中，先前盛放着油墨的油墨盒被安装在打印机之类的适当位置上。在这些条件下，将油墨从油墨盒送往打印头中。在油墨盒和打印头之间可以带有一个用于临时盛放油墨的油墨储存盒。作为油墨组分的一种分散剂，通常利用的是水或者一种水与能够和水良好相容的有机溶剂（例如低级醇、如甲醇、乙醇、异丙醇和 n-丙醇）的混合物。

15 然而，当油墨的液位随着油墨量的减少而下降时，在油墨盒或油墨通道的内部就会产生负压力。当负压力增大时，就会阻止油墨的正常喷出，从而造成模糊打印。为了防止这个缺陷，在油墨盒或油墨通道中带有一个气孔。气孔的位置使得在油墨盒安装于打印机上正常使用的过程中气孔不会浸入油墨中。然而，当打印机或油墨盒在运输或储存过程中发生倾斜时，气孔就可能浸入油墨中，因而就可能会造成油墨从气孔中泄漏。为了防止这个缺点，就提出了将一个能透过空气但不能透过液体的透气式过滤器、如多孔聚四氟乙烯（下文中称作“PTFE”）安装在气孔中的方案。

20 此外，近来发展的一个趋势是，为了提高打印机的打印速度，在油墨盒或油墨通道中加压以便加速油墨的喷射。另外，由于当打印机的环境温度升高时，油墨盒或油墨通道中的油墨可能会从打印头中泄漏，因而在实际情况中在打印结束时要降低油墨盒或油墨通道中的压力，从而使得油墨被吸进来。

25 这样，通过气孔可以在油墨盒或油墨通道内部产生正压力或负压力。因此，就需要利用透气式过滤器来稳定地防止油墨泄漏。

30 为此，本发明的一个目的是提供一种能够有效防止油墨泄漏的油墨盒所用的透气式过滤器。本发明的另一个目的是提供一种包括这种透气式过

滤器的油墨盒。

本发明的上述目的通过一种包括一个叠片的本发明的油墨盒所用的透气式过滤器来实现，该叠片包括至少一个多孔材料层和至少一个透气式衬底层，该多孔材料层包括选自含氟树脂和聚烯烃树脂的至少一种树脂，而该透气式衬底层的抗拉强度为 1MPa 或者更大。

图 1 所示为本发明的油墨盒的一个实施方案的剖面图。

图 2 所示为本发明的油墨盒的另一个实施方案的剖面图。

图 3 所示为本发明的油墨盒的又一个实施方案的剖面图。

图 4 所示为本发明的透气式过滤器的一个实施方案的剖面图。

图 5 所示为本发明的透气式过滤器的另一个实施方案的剖面图。

图 6 所示为在一个实例中制备的一个油墨盒的剖面图。

图 7 所示为在实例中进行的试验过程中油墨盒的转动过程的示意图。

在试验速率为 200mm/min (毫米/分钟) 的条件下，本文中的抗拉强度根据日本工业标准 JIS K 7127-1989 来确定。

本发明的油墨盒所用的透气式过滤器包括利用一个抗拉强度为 1MPa 或者更高的透气式衬底加强的多孔材料，因此能够非常有效地阻止油墨泄漏。特别是，由于利用抗拉强度很高的透气式衬底来加强，因而能够有效地防止因压力的增加或者降低而发生的变形。另外，由于所利用的多孔材料是一种易于高精度地制孔的材料，因此能够提供透气稳定性很高的透气式过滤器。透气式衬底的抗拉强度的上限并没有明确地限制。然而，实际上，从将其焊接于多孔材料上的可操作性的角度来考虑，透气式衬底的抗拉强度优选为 1MPa 到 1500 MPa，更加优选为 3 MPa 到 500 MPa。

在本发明的透气式过滤器中，透气式衬底的透气能力利用格利数 (Gurley number) 来表示优选为 300 sec/100 ml (300 秒/100 毫升) 或者更小。这是因为油墨盒内部与外部之间的压力差可能会迅速消除。在本文中，格利数根据日本工业标准 JIS P 8117-1998 中定义的格利试验方法 (Gurley testing method) 来测定。格利数的下限并没有明确地限制。然而，实际上，从加强多孔材料的角度来考虑，透气式过滤器的格利数优选为从 0.1 sec/100 ml 到 300 sec/100 ml，更加优选为从 0.5 sec/100 ml 到 100 sec/100 ml。

在本发明的透气式过滤器中，优选地使得叠片的至少一层具有防水和防油能力。这是因为可以防止油墨透过过滤器，从而可以更加有效地防止

油墨泄漏。另外，在本发明的透气式过滤器中，多孔材料优选地包括 PTFE，而透气式衬底优选地包括超高分子聚乙烯。

本发明的油墨盒包括一个用于盛放油墨的空间和至少一个其中安放着上述透气式过滤器的气孔。本发明的油墨盒防止油墨泄漏的能力大大提高。

在下文中将结合附图对本发明的实施方案进行描述。

图 1 所示为包括本发明的透气式过滤器的油墨盒的一个实施方案的剖面图。油墨盒的内部包括一个壳体 1，壳体 1 的内部用作盛放油墨 2 的空间。油墨 2 通过油墨注入孔 11 注入壳体的内部。在油墨 2 注入完成后，将盖子 12 安装在油墨注入孔 11 上。当油墨盒安装在打印头之类的设备上时，油墨 2 通过一个油墨喷孔 14 被送入绘图装置诸如打印头中。

在盖子 12 内有一个气孔 13。壳体 12 的内部空间与外部空间（大气空间）通过气孔 13 而相互连通。在气孔 13 上安放着透气式过滤器 5。透气式过滤器 5 与用于关闭油墨注入孔 11 的盖子 12 组合在一起。透气式过滤器 5 可以通过热焊接、超声波焊接、振动焊接、粘接或者粘合等方法预先固定于盖子 12 上。

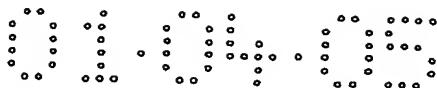
在壳体中可以带有多个气孔 13，每个气孔 13 都包括一个透气式过滤器 5。在这种情况下，优选地，这些气孔的位置使得不管油墨盒处于何种位置，至少有一个气孔不会被引入壳体的预定数量的油墨所覆盖。

可以利用一个叠片来用作透气式过滤器 5，该叠片包括由 PTFE 或聚烯烃树脂构成的多孔材料和一个透气式衬底。这种叠片可以包括至少一个多孔材料层和至少一个透气式衬底。叠片的叠层的层数和顺序并没有明确的限制。为了降低油墨透过透气式过滤器的能力，优选地，上述多孔材料层朝向油墨盒的内部空间（用于盛放油墨的空间）。因此，优选地，透气式过滤器至少有一侧会裸露着上述多孔材料。

图 2 所示为本发明的油墨盒的另一个实施方案的剖面图。

在这种油墨盒中，透气式过滤器 5 直接安装在壳体 1 上以便覆盖住油墨注入孔 11。在图 1 或 2 的实施方案的任何一个中，油墨可以通过利用透气式过滤器抽空壳体而经由油墨喷孔 14 被吸入壳体内部，而不必通过油墨注入孔注入壳体中。

图 3 所示为一个用作本发明油墨盒的油墨储存盒的一个实施方案的剖面图。这种油墨储存盒的结构可以迫使油墨在通过透气式过滤器 5 而施加



的外部压力下而通过喷孔 14 喷出，或者在压力降低时通过吸孔 15 而吸入油墨。

然而，本发明并不限于图 1 至 3 中所示的实施方案，并且可以应用于普通的油墨盒中。

5 在下文中将会对多孔材料和透气式衬底进行进一步的描述。

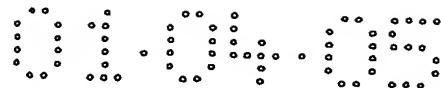
可以用作多孔材料的有多孔含氟树脂薄膜或多孔聚烯烃薄膜。例如，此处可以利用的含氟树脂包括 PTFE、聚氯三氟乙烷、四氟乙烯-六氟丙烯共聚物、四氟乙烯-全氟烷基乙烯醚共聚物和四氟乙烯-乙烯共聚物。而此处可以利用的聚烯烃的实例包括聚乙烯、聚丙烯、聚-4-甲基-1-戊烯和聚-1-丁烯。特别是，多孔 PTFE 薄膜具有良好的透气能力、防油墨能力、防水能力和防油能力，因此不会产生导致透气能力下降的堵塞现象并且可以长时间地防止油墨泄漏。

10 在下文中将会对 PTFE 的制备过程的一个实施方案进行描述。首先，将液体润滑剂加入 PTFE 的细粉中而预制一种糊状混合物。此处所用的液体润滑剂并没有明确的限制，只要它能湿润 PTFE 细粉的表面并能通过析取或干燥方法被除去即可。例如，可以利用碳氢化合物如液体石蜡、石脑油和白油。所要加入的液体润滑剂的量按重量计算优选地大约占 PTFE 细粉重量的约 5% 到 50%。上述预制过程在一定压力下进行以便使得液体润滑剂不会从糊状混合物中被挤出。随后，通过浆料挤压或滚压将得到的预制品加工成薄板。然后将所形成的 PTFE 产品进行至少单轴向拉伸以便得到多孔 PTFE 薄膜。所得到的 PTFE 产品的拉伸过程优选在除去液体润滑剂之后进行。多孔材料可以在不低于 PTFE 熔点的温度下被加热或煅烧。

15 当多孔薄膜的孔径太大时，所形成的薄膜的强度会降低或者当油墨盒的内部压力升高时会发生油墨泄漏。因此，多孔薄膜的平均孔径优选为 10 μm 或者更小，特别优选为 0.01 μm 到 5 μm。

20 同样，当多孔薄膜的厚度太小时，所形成的多孔材料的强度会降低或者当油墨盒的内部压力升高时会发生油墨泄漏。因此，多孔薄膜的厚度优选为 2 μm 或者更大，特别优选为 10 μm 到 1000 μm。

25 透气式衬底的材料、结构和形式要受到限制。特别是，考虑到在受到当通过透气式过滤器进行加压或者排气时所产生的应力的情况下耐用性，透气式过滤器的抗拉强度预定为 1 MPa 或者更高。另外，透气式过滤器的透气能力用格利数表示优选为 300 sec/100 ml 或者更小。从油墨盒



或者安装零件的可熔性的观点来考虑，透气式衬底优选地包括热塑性树脂并且熔点优选为 250°C 或者更低。

可以用作透气式衬底的材料的具体实例包括多孔聚烯烃、无纺织物、纺织织物、网、网状物、海绵、泡沫、多孔金属、金属网以及其它各种多孔材料。从强度、弹性、透气能力、可加工性和可熔性的观点来考虑，特别优选一种多孔超高分子聚乙烯。这种超高分子聚乙烯的测粘平均分子量为 300000 或者更大，优选为 500000 到 10000000。

多孔材料与透气式衬底的复合可以通过简单地将这两层叠合起来或者通过利用热焊接、超声波焊接或振动焊接方法将这两层焊接起来而完成。另外，这两层也可以利用粘合剂（如压敏粘合剂、热熔性粘合剂、热硬化粘合剂）而相互粘接在一起。伴随着加热过程的复合方法（热叠合）可以通过一种包括使透气式衬底局部熔化的方法或者一种包括加热带介于这两层之间的粉状、粒状或网状热熔性粘合剂的叠片从而产生粘接作用的方法来完成。

如上所述，多孔材料和透气式衬底的叠合顺序并没有明确的限制。多孔材料和透气式衬底可以彼此相互叠合。另外，叠片可以包括一个多层多孔材料层的连续式叠片。叠片可以包括多层包含不同树脂的多孔材料层。透气式过滤器的复合结构的实施方案如图 4 和 5 中所示。

图 4 中所示的透气式过滤器 5 为包括相互复合在一起的一个多孔材料层 6 和一个透气式衬底 7 的复合材料。这种透气式过滤器安放时优选地使多孔材料 6 朝向用于盛放油墨的空间。图 5 中所示的透气式过滤器 5 为包括一个介于两个多孔材料层 6 之间的透气式衬底 7 的复合材料。

根据多孔材料或油墨的属性，可以使透气式过滤器具有防水和防油能力。透气式过滤器的多孔材料优选地具有防水和防油能力。然而，透气式衬底可以具有防水和防油能力。或者，透气式过滤器可以全部具有防水和防油能力。

作为防水剂或防油剂，可以具体采用各种含氟聚合物。具有含氟链的聚合物在纤维的表面上形成一个低表面能薄膜，从而产生防水和防油作用。作为含氟聚合物，优选使用具有全氟烷基团的聚合物。作为这种具有全氟烷基团的聚合物，可以利用市场上能够买到的防水或防油剂如 Florad (Sumitomo 3M 公司制造)、Scotchgaurd (Sumitomo 3M 公司制造)、Texguard (DAIKIN INDUSTRIES, LTD. 公司制造)、Unidyne

(DAIKIN INDUSTRIES, LTD. 公司制造) 和 Asahiguard (Asahi Glass Co., Ltd 公司制造). 防水防油处理可以通过将材料浸入防水防油剂中或者在材料上涂上或者喷上防水防油剂而进行. 所涂敷的防水防油剂的量优选地应当使得能够获得足够的防水防油能力而又不会损害透气式过滤器的透气能力.

5 下面通过以下实例对本发明进行进一步描述, 但本发明并不受其所限.

### 实例 1

10 将多孔 PTFE 材料 (厚度: 85 $\mu\text{m}$ ; 孔隙度: 80%; 平均孔径: 1 $\mu\text{m}$ ; 格利数: 3 sec/100 ml) 和 Sintex PS-120 (Mitsui Chemical Co., Ltd. 公司制造; 厚度: 0.6mm; 抗拉强度: 6MPa; 格利数: 1 sec/100 ml) 相互热叠合在一起以便制备与图 4 中所示的结构相同的透气式过滤器, 该多孔 PTFE 材料为一种聚丙烯无纺织物.

15 另外, 为了得到如图 6 中所示的上面安装着一个如此制备的透气式过滤器的油墨盒, 直径为 2cm 而高度为 20cm 的圆筒形塑料壳体 8 中装有数量为 30cm<sup>3</sup> 的市场上可买到的打印机所用的油墨 9 (表面张力: 33dyne/cm). 作为气孔 23 的是一个其中带有一个直径为 5cm 的孔的聚丙烯盖子 22. 盖 10 预先安装在内径为 1mm 的油墨喷孔 24 上. 然后, 包括多孔 PTFE 材料和聚丙烯无纺织物的上述透气式过滤器 5 热熔合于盖子 22 上以便盖住气孔 23, 从而形成一个整体. 透气式过滤器安放好后使得多孔 PTFE 材料朝向油墨 (壳体内部) 而无纺织物朝向大气.

### 实例 2

20 利用甲苯来稀释 Unidyne TG-725 (DAIKIN INDUSTRIES, LTD. 公司制造) 以便制备按重量计算固体含量为 5% 的防水防油剂. 如此制得的防水防油剂被涂敷于多孔 PTFE 材料 (厚度: 85 $\mu\text{m}$ ; 孔隙度: 75%; 平均孔径: 0.2  $\mu\text{m}$ ; 格利数: 21 sec/100 ml) 上. 然后加热至 130°C 保持 3 分钟以便得到多孔防水防油 PTFE 材料. 随后, 与如此制得的多孔防水防油 PTFE 材料结合, 制备一种超高分子多孔聚乙烯 (测粘平均分子量: 4400000; 厚度: 0.5 mm; 抗拉强度: 12 MPa; 格利数: 1.5 sec/100 ml) 来做透气式衬底. 随后按照与实例 1 中相同的方式来制备透气式过滤器. 然后按照与实例 1 中相同的方式来制备油墨盒.

### 实例 3

除了利用多孔聚丙烯材料（厚度：10 $\mu\text{m}$ ; 孔隙度：50%; 平均孔径：0.04  $\mu\text{m}$ ; 格利数：200 sec/100 ml）来代替多孔 PTFE 材料之外，按照与实例 2 中相同的方式来制备透气式过滤器。随后制备油墨盒。

### 比较实例 1

5 除了利用 Tapyrus P030UA-00X (Tonen Tapyrus Co., Ltd. 公司制造；厚度：0.5mm；抗拉强度：0.6MPa；格利数：1 sec/100 ml) 来做透气式衬底之外，按照与实例 1 中相同的方式来制备透气式过滤器，该 Tapyrus P030UA-00X 是一种聚氨酯无纺织物。随后制备油墨盒。

### 比较实例 2

10 除了利用多孔聚丙烯材料（厚度：0.03 mm；抗拉强度：0.9 MPa；格利数：400 sec/100 ml）来做透气式衬底之外，按照与实例 1 中相同的方式来制备透气式过滤器。随后制备油墨盒。

15 在上述实例和比较实例中制得的油墨盒随后各自进行以下几个试验。为了进行油墨泄漏试验，将油墨盒安放在能够以每秒一转的速度转动试样的试验机上并使油墨与透气式过滤器接触，如图 7 中所示。试验机的操作每转动预定转数之后暂停一次，以便用眼睛观察过滤器来查看油墨漏出或泄漏情况，直到试样转动 500000 次为止。当没有观察到油墨漏出或泄漏情况时，就用符号 O 来评价。当观察到出现油墨漏出或泄漏情况时，就用符号 X 来评价。

20 为了进行油墨喷出试验，在保持油墨盒几乎竖直的情况下将盖子拆掉以便打开喷孔 24，如图 6 中所示。在这些条件下，用眼睛观察油墨是否在 10 秒内全部喷出。当油墨喷出时，就用符号 O 来评价。当油墨并未喷出时，就用符号 X 来评价。

油墨泄漏试验和油墨喷出试验的结果如表 1 中所示。

25 表 1

	油墨泄漏试验		油墨喷出试验
	100000 转	500000 转	
实例 1	O	X	O
实例 2	O	O	O
实例 3	O	O	O
比较实例 1	X	-	O
比较实例 2	X	-	X

如上所述，根据本发明，利用通过将至少一个多孔材料层叠合于至少一个透气式衬底层上而制得的透气式过滤器就可以提供一种能够在运输或者储存过程中有效地防止油墨泄漏的油墨盒，其中该多孔材料层包括选自聚四氟乙烯和聚烯烃树脂的至少一种树脂，而该透气式衬底层的抗拉强度为1MPa或者更大。

尽管参照具体实施方案对本发明进行了详细描述，但本领域的技术人员应当清楚可以在不背离其精神和范围的情况下对其进行各种变化和改动。

01·04·05

说 明 书 附 图

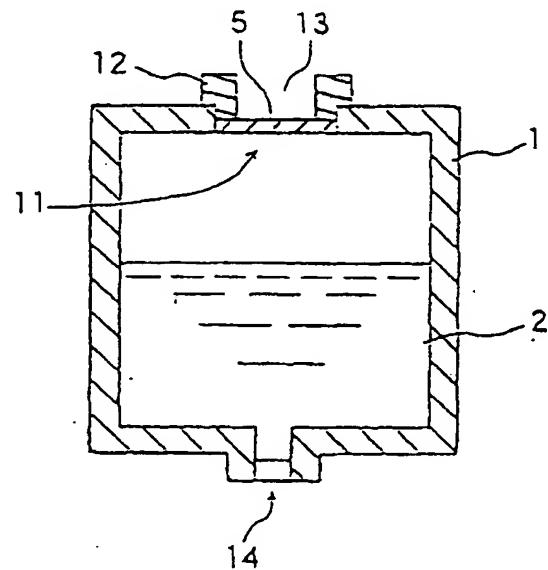


图 1

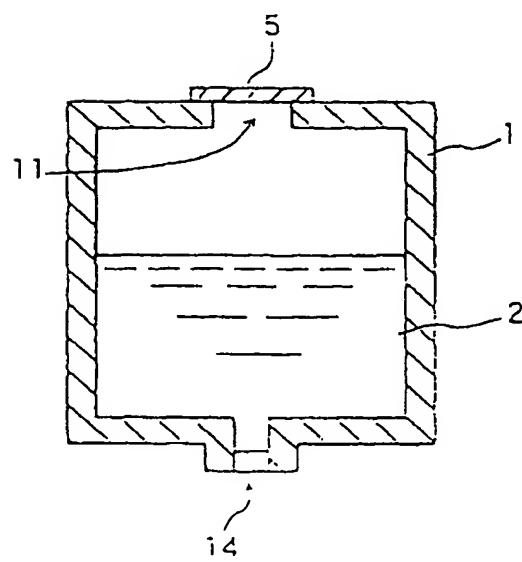


图 2

01·04·05

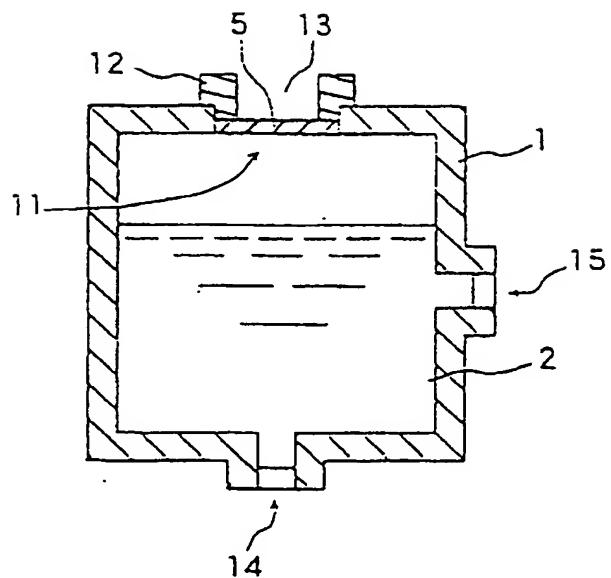


图 3

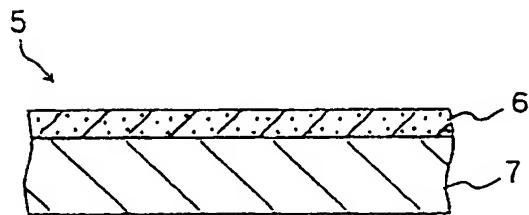


图 4

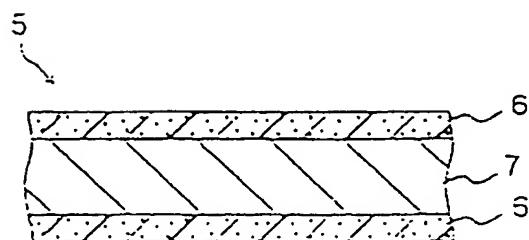


图 5

01.04.05

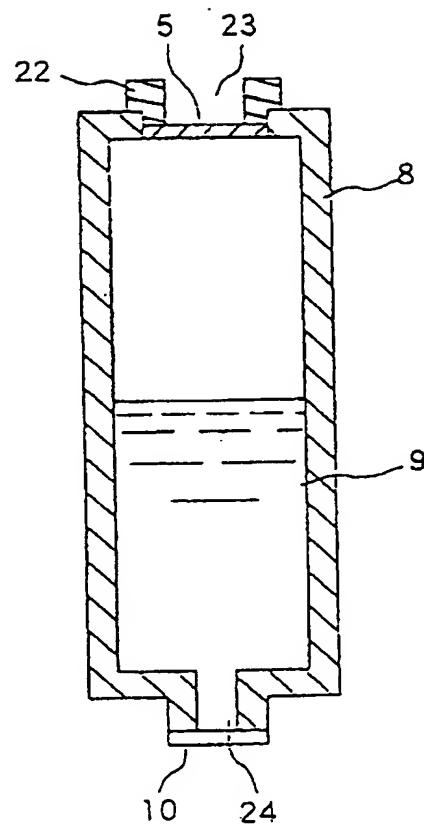


图 6

01.04.05

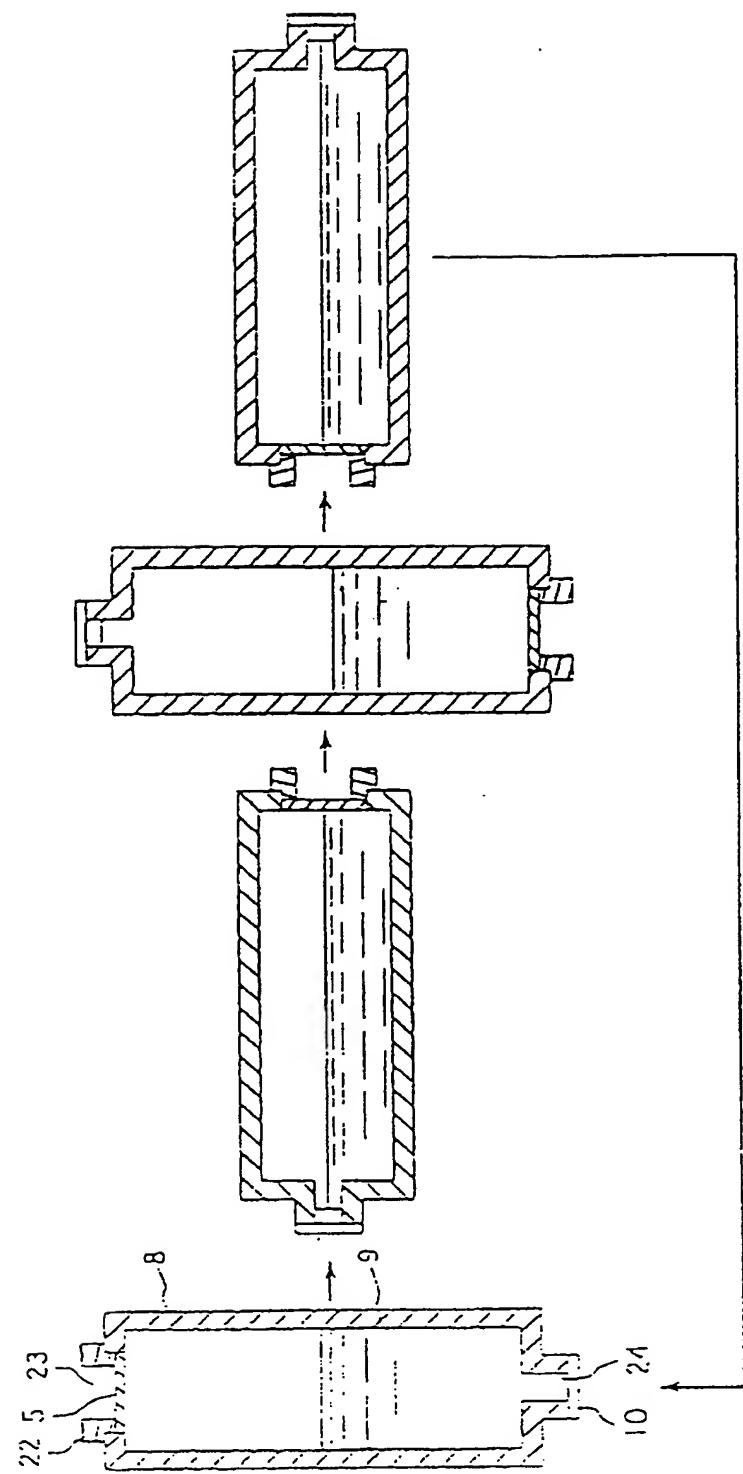


图 7

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